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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413				
EXAMINER DIAMOND, ALAN D				
ART UNIT 1753		PAPER NUMBER		

DATE MAILED: 05/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/625,535

Applicant(s)

MURATA ET AL

Examiner

Alan Diamond

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(e). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.

DETAILED ACTION

Claim Objections

1. Claims 1 and 6 are objected to because of the following informalities: In claim 1, at line 2, the word "an" should be deleted. In claim 1, at line 5, the word "an" should be deleted. In claim 1, at line 7, the term "a heat" should be changed to "heat". In claim 6, at line 2, the word "an" should be deleted. In claim 6, at line 5, the word "an" should be deleted. In claim 6, at line 7, the term "a heat" should be changed to "heat".

Appropriate correction is required.

Double Patenting

2. Applicant is advised that should claim 1 be found allowable, claim 6 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). Claims 1 and 6 are so close in content that they cover the same thing, despite a slight difference in wording. Claim 1, at line 7, recites "a cooling device ...", whereas claim 6, at line 7, recites "a cooling means ...". It is the Examiner's position that in claim 6, the "cooling means for causing a cooling liquid to receive a heat from the photoelectric conversion cell by contacting the cooling liquid and a back surface of the cell holder portion with each other" does not invoke 35 USC 112, 6th paragraph, since the "means for" language here recites sufficient structure and acts for achieving the specified function. The structure and acts for the cooling means in claim

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6 are essentially the same as the structure and acts for the cooling device in claim 1, which recites "a cooling device that causes a cooling liquid to receive a heat from the photoelectric conversion cell by contacting the cooling liquid and a back surface of the cell holder portion with each other." There is no difference in scope between what is encompassed by the cooling device in claim 1 and the cooling means in claim 6.

Claim Rejections - 35 USC § 102/103

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kushch et al (U.S. Patent 5,711,661).

Kushch et al teaches a thermophotovoltaic generator comprising a burner that is supplied with gas/air mixture through inlet fitting (57) for introducing the combustible mixture into a plenum (57); an emitter (61) heated by the combustion heat produced by the burner; a photoelectric conversion cell (68) that converts radiant energy from the emitter into electric power; and a cell holder portion which, as seen in Figure 5, is the

left-side, vertical, outer surface wall of the water cooled heat sink (69) (see also col. 2, lines 10-24; and col. 9, lines 1-50). In Figure 5, a skilled artisan would most certainly assume that the water cooled heat sink has its own walls in view of the fact that it is transporting water, and the photoelectric conversion cell is on said left-side, vertical, outer surface wall. As seen in Figure 5, the water cooled heat sink (69) reads on the instant cooling device and cooling means, and causes cooling water to receive heat from the photoelectric conversion cell by contacting the cooling water and said left-side, vertical, outer surface wall with each other (see also col. 9, lines 1-50). Note in Figure 5 that the surface where said left-side, vertical, outer surface wall and cooling liquid contact each other is a vertical, or close to vertical, (i.e., it is a non-horizontal) surface. Since Kushch et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instant cell holder portion would obviously have been present once Kushch et al's thermophotovoltaic generator has been provided. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

Claim Rejections - 35 USC § 103

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kushch et al (U.S. Patent 5,711,661).

Kushch et al teaches a thermophotovoltaic generator comprising a burner that is supplied with gas/air mixture through inlet fitting (57) for introducing the combustible mixture into a plenum (57); an emitter (61) heated by the combustion heat produced by

the burner; a photoelectric conversion cell (68) that converts radiant energy from the emitter into electric power; and a cell holder portion, which, as seen in Figure 5, is the left-side, vertical, outer surface wall of the water cooled heat sink (69) (see also col. 2, lines 10-24; and col. 9, lines 1-50). In Figure 5, a skilled artisan would most certainly assume that the water cooled heat sink has its own walls in view of the fact that it is transporting water, and the photoelectric conversion cell is on said left-side, vertical, outer surface wall. As seen in Figure 5, the water cooled heat sink (69) reads on the instant cooling device and cooling means, and causes cooling water to receive heat from the photoelectric conversion cell by contacting the cooling water and said left-side, vertical, outer surface wall with each other (see also col. 9, lines 1-50). Note in Figure 5 that the surface where said left-side, vertical, outer surface wall and cooling liquid contact each other is a vertical, or close to vertical, (i.e., it is a non-horizontal) surface. Note in said Figure 5 that the cooling water flows in at the bottom of the heat sink (69) and exits at the top of the heat sink (69). A skilled artisan would readily recognize that a pump would be needed to make the water flow up from the bottom to the top of the heat sink. Such a pump corresponds to the instant external circuit that accelerates circulation of the cooling liquid. Kushch et al teaches the limitations of the instant claim other than the difference which is discussed below.

Kushch et al does not specifically teach an external circuit that accelerates circulation of its cooling water. However, as noted above and as seen in Kushch et al's Figure 5, the cooling water flows in at the bottom of Kushch et al's heat sink (69) and exits at the top of the heat sink (69). A skilled artisan would readily recognize that a

pump would be needed to make the water flow up from the bottom to the top of the heat sink. Such a pump corresponds to the instant external circuit that accelerates circulation of the cooling liquid. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a pump so as to pump Kushch et al's cooling water from the bottom entrance to the top exit of the heat sink (69) because a skilled artisan would readily recognize that a pump would be needed to make the water flow up from the bottom to the top of the heat sink (69).

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kushch et al as applied to claim 4 above, and further in view of Fraas et al (U.S. Patent 5,312,521).

Kushch et al, as relied upon for the reasons recited above, teaches the limitations of claim 5, the difference being that Kushch et al does not specifically teach the use of a fan to improve heat dissipation characteristics. Fraas et al teaches a thermophotovoltaic generator wherein a fan is provided for supplying air for combustion and for supplying cooling air for cooling the photoelectric cells (see col. 1, lines 1-4; col. 3, lines 46-51; col. 5, lines 19-22; and claim 13 at col. 10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Kushch et al's thermophotovoltaic generator with a fan so as to provide the benefits of supplying air for combustion and for supplying cooling air for cooling the photoelectric cells, as taught by Fraas et al. A skilled artisan would recognize that the cooling air would provide the advantage of further cooling in addition to Kushch et al's heat sink (69).

8. Claims 1-4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kushch et al (U.S. Patent 5,711,661) in view of Silversmith (U.S. Patent 3,237,683).

Kushch et al teaches a thermophotovoltaic generator comprising a burner that is supplied with gas/air mixture through inlet fitting (57) for introducing the combustible mixture into a plenum (57); an emitter (61) heated by the combustion heat produced by the burner; a photoelectric conversion cell (68) that converts radiant energy from the emitter into electric power; and a cell holder portion, which, as seen in Figure 5, is the left-side, vertical, outer surface wall of the water cooled heat sink (69) (see also col. 2, lines 10-24; and col. 9, lines 1-50). In Figure 5, a skilled artisan would most certainly assume that the water cooled heat sink has its own walls in view of the fact that it is transporting water, and the photoelectric conversion cell is on said left-side, vertical, outer surface wall. As seen in Figure 5, the water cooled heat sink (69) reads on the instant cooling device and cooling means, and causes cooling water to receive heat from the photoelectric conversion cell by contacting the cooling water and said left-side, vertical, outer surface wall with each other (see also col. 9, lines 1-50). Note in Figure 5 that the surface where said left-side, vertical, outer surface wall and cooling liquid contact each other is a vertical, or close to vertical, (i.e., it is a non-horizontal) surface. Note in said Figure 5 that the cooling water flows in at the bottom of the heat sink (69) and exits at the top of the heat sink (69). A skilled artisan would readily recognize that a pump would be needed to make the water flow up from the bottom to the top of the heat sink. Such a pump corresponds to the instant external circuit that accelerates

circulation of the cooling liquid. Kushch et al teaches the limitations of the instant claims other than the differences which is discussed below.

With respect to claims 2 and 3, Kushch et al does not specifically teach the use of two kinds of liquids in place of said water for its heat transfer liquid. However, Kushch et al is not limited to water for its heat transfer liquid. Silversmith teaches heat transfer liquids that provide excellent heat transfer characteristics and are non-corrosive to metals (see col. 1, lines 8-51). The heat transfer fluid is a normally liquid N,N-dialkyl alkane-carboximide, such as N,N-dimethylacetamide, which can be mixed with up to about 2% by weight water (see col. 2, line 71 through col. 3, line 45; and col. 4, line 37). Water (Bp. 100°C, Sp. Gr. 1.0) has a greater specific gravity and lower boiling point than said N,N-dimethylacetamide (Bp. 165°C, Sp. Gr. 0.937). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used N,N-dimethylacetamide mixed with up to 2% by weight water as the heat transfer fluid in Kushch et al's thermophotovoltaic generator because the N,N-dimethylacetamide, which can be mixed with up to 2% by weight water, provides excellent heat transfer characteristics and is non-corrosive to metals, as taught by Silversmith.

With respect to claim 4, Kushch et al does not specifically teach an external circuit that accelerates circulation of its cooling water. However, as noted above and as seen in Kushch et al's Figure 5, the cooling water flows in at the bottom of Kushch et al's heat sink (69) and exits at the top of the heat sink (69). A skilled artisan would readily recognize that a pump would be needed to make the water flow up from the

bottom to the top of the heat sink. Such a pump corresponds to the instant external circuit that accelerates circulation of the cooling liquid. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a pump so as to pump Kushch et al's cooling water from the bottom entrance to the top exit of the heat sink (69) because a skilled artisan would readily recognize that a pump would be needed to make the water flow up from the bottom to the top of the heat sink (69).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kushch et al in view of Silversmith as applied to claims 1-4 and 6 above, and further in view of Fraas et al (U.S. Patent 5,312,521).

Kushch et al in view of Silversmith, as relied upon for the reasons recited above, teaches the limitations of claim 5, the difference being that Kushch et al does not specifically teach the use of a fan to improve heat dissipation characteristics. Fraas et al teaches a thermophotovoltaic generator wherein a fan is provided for supplying air for combustion and for supplying cooling air for cooling the photoelectric cells (see col. 1, lines 1-4; col. 3, lines 46-51; col. 5, lines 19-22; and claim 13 at col. 10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the thermophotovoltaic generator of Kushch et al in view of Silversmith with a fan so as to provide the benefits of supplying air for combustion and for supplying cooling air for cooling the photoelectric cells, as taught by Fraas et al. A skilled artisan would recognize that the cooling air would provide the advantage of further cooling in addition to the Kushch et al's heat sink (69).

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents 4,707,560, 4,836,862, and 5,772,793, and WO 03/017376 are hereby made of record.
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
May 4, 2005

